

JAPAN

EDICT OF GOVERNMENT

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JIS B 9708 (2002) (English): Safety of machinery
-- Safety distances to prevent danger zones being
reached by the lower limbs

ISO INSIDE

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*The citizens of a nation must
honor the laws of the land.*

Fukuzawa Yukichi

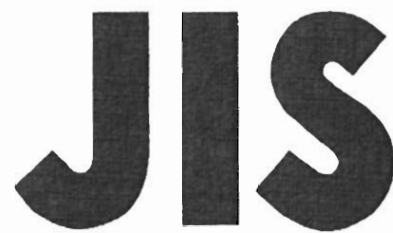
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JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS B 9708 : 2002

(ISO 13853 : 1998)

**Safety of machinery—
Safety distances to prevent danger
zones being reached by the lower
limbs**

ICS 13.110; 13.180

Reference number : JIS B 9708 : 2002 (E)

B 9708 : 2002 (ISO 13853 : 1998)

Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry, and the Minister of Health, Labour and Welfare through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law:

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Technical Committee on Industrial
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In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

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Safety of machinery— Safety distances to prevent danger zones being reached by the lower limbs

Introduction This Japanese Industrial Standard has been prepared based on the first edition of **ISO 13853** *Safety of machinery—Safety distances to prevent danger zones being reached by the lower limbs* published in 1998 without modifying the technical contents.

The foreword of the original International Standard has been excluded because it is not part of the provisions.

Also, the portion of introduction of the original International Standard which is described in another standard has been excluded from this Standard.

In specifying safety distances to prevent lower-limb access and distances to impede free access, a number of aspects have to be taken into consideration, such as:

- reach situation of the lower limbs occurring when machinery is being used;
- reliable surveys of anthropometric data, taking into account ethnic groups likely to be found in the countries concerned;
- biomechanical facts, such as compression and stretching of parts of the human body and limits of joint rotation;
- technical and practical aspects.

If these aspects were further developed, the current state of the art reflected in this Standard could be improved.

1 Scope This Standard establishes values for safety distances to prevent access and distances to impede free access to machinery danger zones to prevent their being reached by the lower limbs of persons of 14 years of age and above.

NOTE 1 The values given are based on practical experience which has been found to be adequate for this group of persons.

These distances apply when adequate safety can be achieved by distance alone, and when access by the upper limbs is not foreseeable according to the risk assessment.

NOTE 2 These safety distances will not provide sufficient protection against certain hazards, for example radiation and emission of substances. For such hazards, additional or other measures need to be taken.

The safety distances to prevent access relate to openings, and serve to protect those persons trying to reach danger zones under the conditions specified for different reaching situations.

The distances to impede free relate to the height from ground level to the protective structure, and serve to reduce risk to persons by limiting the free movement of the lower limbs.

NOTE 3 If persons below 14 years of age are to be taken into account, it is not relevant to establish values other than those for upper limbs. In this case the safety distances to prevent danger zones being reached by the upper limbs, derived from table 5 of **JIS B 9707 : 2002**, will apply.

For certain applications, there are justifiable reasons to deviate from these distances. Standards dealing with these applications should indicate how adequate safety can be achieved.

NOTE 4 The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21**.

ISO 13853 : 1998 *Safety of machinery—Safety distances to prevent danger zones being reached by the lower limbs* (IDT)

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 9702 : 2000 *Safety of machinery—Principles of risk assessment*

JIS B 9707 : 2002 *Safety of machinery—Safety distances to prevent danger zones being reached by the upper limbs*

Remarks : **ISO 13852 : 1996** *Safety of machinery—Safety distances to prevent danger zones being reached by the upper limbs* is identical with the said standard.

ISO/DIS 12100-1 *Safety of machinery—Basic concepts and general principles for design—Part 1 : Basic terminology, methodology*

3 Definitions For the purposes of this Standard, the definitions given in **ISO/DIS 12100-1** and **JIS B 9707 : 2002** apply.

4 Safety distances to prevent access by lower limbs

4.1 General

4.1.1 Assumptions The safety distances have been derived by making the following assumptions:

- the protective structures and any openings in them retain their shape and position; otherwise further consideration shall be given to achieve adequate safety;
- safety distances are measured from the surface restricting the body or the relevant part of the body.

4.1.2 Risk assessment A risk assessment (see **ISO/DIS 12100-1** and **JIS B 9702 : 2000**) shall be made before determination of the required safety distance for preventing reaching danger zones.

This Standard shall be used if the risk assessment justifies that there is a risk only to the lower limbs. Where there is a risk to both upper and lower limbs, then for a given opening the largest safety distance given in table 1 of this Standard or in table 4 of **JIS B 9707** : 2002 shall be used. The minimum safety distances s_r given in table 1 apply to persons reaching through openings using the lower limbs in an attempt to reach a danger zone.

4.2 Reaching through openings using the lower limbs

4.2.1 Openings of regular shape The dimension e of openings corresponds to the side of a square opening, the diameter of a round opening or the narrowest dimension of a slot opening. Slot openings with $e > 180$ mm and square or round openings with $e > 240$ mm will allow access for the whole body. The values given in table 1 are independent of whether clothing or footwear is being worn.

4.2.2 Openings of irregular shape In the case of openings of irregular shape, the following steps shall be carried out.

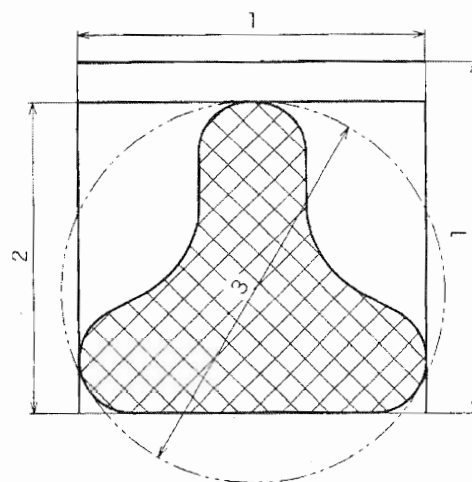
- a) Determine first:
 - the diameter of the smallest round opening and
 - the side of the smallest square opening and
 - the width of the narrowest slot openinginto which the irregular opening can be completely inserted (see hatched area in figure 1).
- b) Select the corresponding three safety distances in accordance with table 1.
- c) The shortest safety distance of the three values selected in **b)** can be used as the safety distance for this opening of irregular shape.

Table 1

Unit: mm

| Part of lower limb | Illustration | Opening | Safety distance sr | |
|-------------------------|--------------|--------------------|----------------------|--------------------|
| | | | Slot | Square or round |
| Toe tip | | $e \leq 5$ | 0 | 0 |
| Toe | | $5 < e \leq 15$ | ≥ 10 | 0 |
| | | $15 < e \leq 35$ | $\geq 80^{1)}$ | ≥ 25 |
| Foot | | $35 < e \leq 60$ | ≥ 180 | ≥ 80 |
| | | $60 < e \leq 80$ | $\geq 650^{2)}$ | ≥ 180 |
| Leg (toe tip to knee) | | $80 < e \leq 95$ | $\geq 1\ 100^{3)}$ | $\geq 650^{2)}$ |
| Leg (toe tip to crotch) | | $95 < e \leq 180$ | $\geq 1\ 100^{3)}$ | $\geq 1\ 100^{3)}$ |
| | | $180 < e \leq 240$ | not admissible | $\geq 1\ 100^{3)}$ |

Notes 1) If the length of the slot opening is ≤ 75 mm, the distance can be reduced to ≥ 50 mm.
2) The value corresponds to Leg (toe tip to knee).
3) The value corresponds to Leg (toe tip to crotch).



Key

- 1 Side
- 2 Width
- 3 Diameter

Figure 1

5 Distances to impede free access by lower limbs An additional protective structure can be used to restrict the free movement of the lower limbs under existing protective structures. For this method, the distances given in annex A relate to the height from the ground or reference plane to the protective structure.

- NOTES
- 1 This method provides limited protection; in many cases other methods will be more appropriate.
 - 2 Additional precautions may be required to restrict access of the upper limbs and/or to prevent access of the whole body to the danger zone.

Annex A (informative) **Impeding free movement under protective structures**

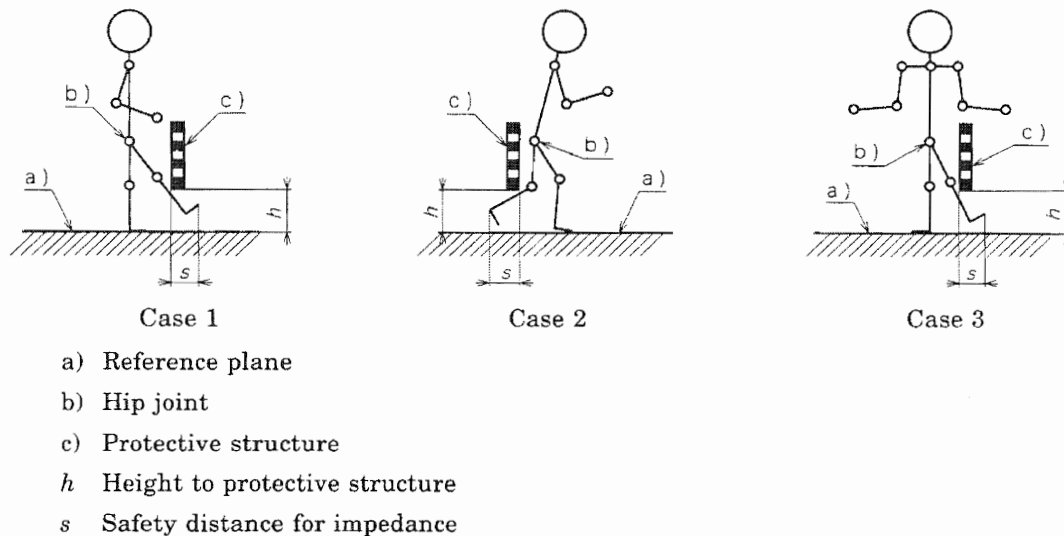


Figure A.1

Table A.1 gives distances s for particular cases where access of the lower limbs is impeded with the person remaining in a standing position (see figure A.1) without any additional support.

Where there is a risk of slipping or misuse, applying the values given in table A.1 can be inappropriate.

There should be no interpolation between the values in this table. If the height h up to the protective structure lies between two values, then the distance for the higher value of h should be used.

Table A.1

Unit: mm

| Height, h , up to protective structure | Distance s | | |
|--|---------------|---------------|---------------|
| | Case 1 | Case 2 | Case 3 |
| $h \leq 200$ | ≥ 340 | ≥ 665 | ≥ 290 |
| $200 < h \leq 400$ | ≥ 550 | ≥ 765 | ≥ 615 |
| $400 < h \leq 600$ | ≥ 850 | ≥ 950 | ≥ 800 |
| $600 < h \leq 800$ | ≥ 950 | ≥ 950 | ≥ 900 |
| $800 < h \leq 1\,000$ | $\geq 1\,125$ | $\geq 1\,195$ | $\geq 1\,015$ |

Errata for JIS (English edition) are printed in *Standardization Journal*, published monthly by the Japanese Standards Association, and also provided to subscribers of JIS (English edition) in *Monthly Information*.

Errata will be provided upon request, please contact:
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